PORTAL USPTO
Subscribe (Full Service) Register (Limited Service, Free) Login
Search: The ACM Digital Library The Guide
THE GUIDE TO COMPUTING LITERATURE
Feedback

Concurrent garbage collection using hardware-assisted profiling

Full text Pdf (1.74 MB)

Source International Symposium on Memory Management archive
Proceedings of the 2nd international symposium on Memory management table of contents
Minneapolis, Minnesota, United States
Pages: 80 - 93
Year of Publication: 2000
ISBN:1-58113-263-8
Also published in ...

Authors Timothy H. Heil Electrical and Computer Engineering, University of Wisconsin - Madison, 1415 Engineering Drive
James E. Smith Electrical and Computer Engineering, University of Wisconsin - Madison, 1415 Engineering Drive

Sponsor SIGPLAN: ACM Special Interest Group on Programming Languages

Publisher ACM New York, NY, USA

Bibliometrics Downloads (6 Weeks): 4, Downloads (12 Months): 28, Citation Count: 5

Additional Information: abstract cited by index terms collaborative colleagues peer to peer

Tools and Actions: Review this Article
Save this Article to a Binder Display Formats: BibTex EndNote ACM Ref

DOI Bookmark: Use this link to bookmark this Article: http://doi.acm.org/10.1145/362422.362466
What is a DOI?

ABSTRACT

In the presence of on-chip multithreading, a Virtual Machine (VM) implementation can readily take advantage of *service threads* for enhancing performance by performing tasks such as profile collection and analysis, dynamic optimization, and garbage collection concurrently with program execution. In this context, a hardware-assisted profiling mechanism is proposed. The *Relational Profiling Architecture* (RPA) is designed from the top down. RPA is based on a relational model similar to the relational database model. Instructions selected for profiling produce a record of information. A simple *query engine* examines these records for patterns, and performs simple actions on matching records.

The power and flexibility of RPA is demonstrated by developing a concurrent generational garbage collector for Java. Detailed execution driven simulations show that this collector has an average runtime overhead of approximately 0.6%. The short pauses in the application required for synchronization with the garbage collector are at most 54 microseconds, given a 1GHz clock frequency.

CITED BY *5*

Timothy Heil , James E. Smith, Relational profiling: enabling thread-level parallelism in virtual machines, Proceedings of the 33rd annual ACM/IEEE international symposium on Microarchitecture, p.281-290, December 2000, Monterey, California, United States

G. Chen , R. Shetty , M. Kandemir , N. Vijaykrishnan , M. J. Irwin , M. Wolczko, Tuning garbage collection for reducing memory system energy in an embedded java environment, ACM Transactions on Embedded Computing Systems (TECS), v.1 n.1, p.27-55, November 2002

David Detlefs , Rose Knippel , William D. Clinger , Matthias Jacob, Concurrent Remembered Set Refinement in Generational Garbage Collection, Proceedings of the 2nd Java™ Virtual Machine Research and Technology Symposium, p.13-26, August 01-02, 2002

Cliff Click , Gil Tene , Michael Wolf, The pauseless GC algorithm, Proceedings of the 1st ACM/USENIX international conference on Virtual execution environments, June 11-12, 2005, Chicago, IL, USA

Ajeet Shankar , S. Subramanya Sastry , Rastislav Bodik , James E. Smith, Runtime specialization with optimistic heap analysis, ACM SIGPLAN Notices, v.40 n.10, October 2005

↑ INDEX TERMS

Primary Classification:
- D. Software
  - D.4 OPERATING SYSTEMS
    - D.4.2 Storage Management
      - Subjects: Garbage collection

Additional Classification:
- D. Software
  - D.3 PROGRAMMING LANGUAGES
    - D.3.2 Language Classifications
      - Subjects: Macro and assembly languages
    - D.3.4 Processors
      - Subjects: Memory management (garbage collection); Compilers
  - D.4 OPERATING SYSTEMS
    - D.4.1 Process Management
      - Subjects: Concurrency; Threads
- F. Theory of Computation
  - F.1 COMPUTATION BY ABSTRACT DEVICES
    - F.1.2 Modes of Computation
      - Subjects: Parallelism and concurrency
- K. Computing Milieux
  - K.6 MANAGEMENT OF COMPUTING AND INFORMATION SYSTEMS
    - K.6.2 Installation Management
      - Subjects: Benchmarks

General Terms:
Design, Management, Performance, Theory

↑ Collaborative Colleagues:
Timothy H. Heil: colleagues
James E. Smith: colleagues

↑ Peer to Peer - Readers of this Article have also read:

- Data structures for quadtree approximation and compression Communications of the ACM 28, 9
  Hanan Samet
- A hierarchical single-key-lock access control using the Chinese remainder theorem Proceedings of the 1992 ACM/SIGAPP Symposium on Applied computing
  Kim S. Lee , Huizhu Lu , D. D. Fisher
- An intelligent component database for behavioral synthesis Proceedings of the 27th ACM/IEEE conference on Design automation
  Gwo-Dong Chen , Daniel D. Gajski
- The GemStone object database management system Communications of the ACM 34, 10
  Paul Butterworth , Allen Otis , Jacob Stein
- Putting innovation to work: adoption strategies for multimedia communication systems Communications of the ACM 34, 12
  Ellen Francik , Susan Ehrlich Rudman , Donna Cooper , Stephen Levine

↑ This Article has also been published in:

- ACM SIGPLAN Notices
  Volume 36 , Issue 1 Jan 2001

The ACM Portal is published by the Association for Computing Machinery. Copyright © 2008 ACM, Inc.
Terms of Usage Privacy Policy Code of Ethics Contact Us

Useful downloads: Adobe Acrobat QuickTime Windows Media Player Real Player